## SUBWAY BUILDERS' MASTER TASK IN THE WILLIAM STREET MARSH

novel scheme for the destruction of Boston a few years lustrete a theory rather than to adance a practical proposition. As he

"An enemy need not bother mustering battleships or waste his time bombarding from afar the intellectual Hub of this land of ours. In time of peace let him have his spies build a big pumping station right in the middle of that city and at the proper time start drawing indiscriminately from the ground below the water saturat-ing the subsoil. You know a very age part of Boston's big buildings reves upon floating foundations. Pump out the water in the supporting quicksand and down those structures would tumble into the yawning cavities so created. It would be far more ef-fective in 19s demolition than the projectiles of a hostile fleet!"

somewhat similar idea occurred to a good many of the property owners along William street when the plans for the new subway were under discussion. Their holdings have an assessed vilue of \$40,000,000, and it was not pleasant to think of what might happen when the contractors reached the stratum of quicksand.

Their anxiety provoked all sorts of arguments against running the subway through that narrow street. In he end the Public Service Commission was so well convinced that the work could be done without needless hazars that it assumed responsibility or any resulting property damages. To-day quite twenty-three per cent. of the excavating is an accomplished fact; the public scarcely realize what is taking place beneath their feet, and none of the adjacent skyscrapers has sagged a hair's breadth.

System of bracing to hold up

the sidewalks and roadway

while tunnel is being built.

were completed there was an exhaus-

for the settlement anticipated when

vide clearance for

below existing sub-surface pines and

conduits, but is kept above the bot-

tom of the building foundations.

heads are provided along the heading

"In this way, the foundation may

ing the good and the evil qualities to

For this reason Father Curry's opin-

ions on the possibility of true reforma-

titude of the world toward the man

tions that exist in Sing Sing. There

like human beings instead of beasts.

perience and has amply studied the

question to understand the best meth-

convinced me that some of Thomas

Mott Osborne's ideas which were in-

stalled at Auburn prison at his sug-

gestion after he had served a week's

ested in had been arrested for an of-

he was a good man at heart and had

committed the offence on an impulse.

to help pay for furnishings for his

"A young man whom I was inter-

ods for improving the prison.

of especial interest.

who has been in prison."

to retain a sufficient weight of ma-

The municipal engineers have tive discussion as to the methods for learned much during the years that excluding material of this nature from have intervened since the first sub-excavations extending below water way was built, and much other infor-level. Evidence was submitted to show mation has come to them in connec- that fluctuations of the ground water tion with the construction of Manhat- could be traced to the rise and fall of tan's towering office buildings. It was the tide, and that, in the case of a this accumulation of knowledge that twenty story building, the foundations gave the experts courage to tackle the had purposely been set one inch above exceptional task which the William the desired elevation so as to provide street subway represents.

The street is very narrow, the the full building load was applied. It foundations for the flanking structures was said that a settlement of that are shallow and the loads upon these amount subsequently developed." foundations are enormous. As a mat- In other words, this meant that the for of fact some of these buildings structure in question was, in effect, a lay a burden of from thirty to forty floating one resting upon confined tons upon every linear foot of their quicksand. Therefore, a further and substructure, and in some cases where more serious subsidence might take the load is distributed upon piers as place if this semi-fluid support were nuch as from 500 or 600 tons is concentrated upon single columns. It is evident that under the best of conditions it would be a perilous matter to burrow indiscriminately below these supports, and yet that is exactly what supports, and yet that is exactly what the contractors are doing to-day in the prosecution of their work. As one engineer expressed it, "We shall be upon the firing line when we get down to the foundation limits of these buildings, and just as nature these buildings, and just as nature line. This excavation is confined to may change in her mood or state there must we muster our forces and alter our attack and defence. We must carry on our backs, as it were, the burden of the flanking buildings tom of the building foundations while we form the walls of the subway which, when done, will be rigid proached, longitudinal timber bulkenough to hold in place the supporting groundwork of the skyscrapers."

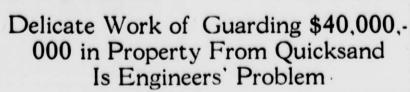
In order that the layman may un- terial above the underlying soil so as derstand the peculiar conditions that to prevent displacement of ground have to be met in digging the William under the foundations. street subway it is needful to give some idea of the physical conditions of be exposed from the street side and, the ground below the street level. The for that reason, we do not have to tunnel has to make its way through enter the building for underpinning filtering through the soil as the head- are reached. sand and gravel and quicksand and at purposes. It also affords means for the ing advances." no point will solid rock offer a resting place. The excavators are working in he midst of the primordial, and each excavation. In addition, by a system quicksand and the like. These nearly as much for the underpinning foot of advance confirms the findings of the preliminary explorations. According to John H. Madden, the assistant division engineer, conditions are those demanding the nicest sort of en- FATHER CURRY AND THE CONVICT gineering skill.

From the borings made rock was shown as lying from forty-six feet to ECAUSE of his religious work "Just when I thought I had this my life. All the criminal features in over one hundred feet below the surface, and it is explained that the retreat of the glacier which once covered this territory and terminated in vicinity of New York had been followed by the formation over the Church in James street, is one of the surprised that I lost interest in his had changed him completely. Since buildings contiguous to Hanover rock outcrop of a layer of hardpan. consisting of broken rock and detritus

be found in criminals. The water from the ocean had advanced, covering the lower section of Manhattan Island, and the fine sand tion on the part of the criminal are informed that this man, whom we will carried by this ocean water had settled until the thickness of the bed reached the then water level. The overlying, coarser layers were subsethem do make good if the world gives ferred to Auburn prison, where some the complete transformation that I quently formed from inland sources. them the chance," said Father Curry. of Mr. Osborne's suggestions had been The first deposit of sand was water "But the chief difficulty lies in the at- put in practical use. Incidentally I worn and saturated, having very fine grains from one-hundredth to onethousandth of an inch in diameter, resembling, when flowing, a heavy dense

A part of the William street subway must traverse a section of the city known to civil engineers as "the marsh," and semi-liquid sand abounds there in pockets. So long as the stuff s confined it is not a menace to superposed structures and, in fact, it has a otable supporting capacity, but the eril lies in tapping these pockets and letting the stuff run away. Technically this is the material commonly called quicksand. Mr. Madden says: This is the blanket of quicksand

encountered below water level in the lower sections of the city. Its name omes from a German phrase which, ranglated, means 'swimming sand.' le this sand would settle in the water if the latter were absolutely the slightest agitation would sentence there produce some good. cause it to resume its original condition of 'swimming' in the water from which it had been deposited. While fence and I used some influence to quiescent and confined such sand is have the man released, believing that ractically incompressible and, therefore, possesses a high bearing value; and unstable properties. "Before the plans for the subway home.



EE

soils, and by sapping them gradually words, to support the \$40,000,000 of their dangerous constituent, water, worth of abutting structures, they

the materials acquire stability. water a matter of seventeen feet. But it does not suffice merely to draw off

A view of narrow William street, through which the much

discussed section of the subway is to run.

through shafes located for the main vents any wholesale displacement of Isaac, figure upon spending pretty

on another prisoner with an iron bar

"Speaking of Warden Osborne's his fellow prisoner.

theories I think he has the right idea. "Well, I had forgotten all about Father Curry went on, "I do not be-

There is no doubt that there is room James when I received a letter one lieve in capital punishment personally,

for great improvement in the condi- day in which was enclosed the equiva- but I admit the State has the supreme

should be no such things as dark cells James stated that he had never in- right. Warden Osborne has expressed

or anything like that, for it is easy tended to cheat me out of the money, my sentiments when he declared that

enough to govern the men, provided but he did not have the opportunity of while he is against capital punishment you understand them and treat them getting together the sum of \$19 until he will execute prisoners and do the

Warden Osborne has had sufficient ex- work and economizing on extras, such long as the law compels him to. There-

could not see my way clear to accept

Cashin, chaplain of Sing Sing, who !

the request that he distribute it among

never saw such a changed man in all ment"

the prisoners in the death cells.

"There is no doubt that some of and for the assault he had been trans-

The contractors for this section of

work among the prisoners and chari-

now that you could wear one of these

strain which is really inhuman.

table deeds.

wish to tell you that James was good collars and be one of us," and Father

at heart but had a violent temper, Curry put his finger on his clerical

lent of the money I had loaned him right to take a life for a life. The

some months previous. In his letter Roman Catholic Church admits this

he reached Auburn. By dint of hard work thoroughly according to law as

as tobacco, he had been able to save the amount. Of course this sacrifice be put into practice the law must be on James's part so impressed me that changed. If you could visit the death

which was the cause of the assault on collar to emphasize his words.

will have to spend quite \$604,500, In this way, the workers have al-ready lowered the level of the ground will cost a little more than \$700,000. "It will be readily appreciated that the underpinning of buildings along

this troublesome water; it is equally the route is a very prominent factor necessary to prop up the exposed foundations when the bottoms of these conditions encountered are unique in the number of large and heavy buildings, few of which have foundations to rock or hardpan, and with these exceptions all other foundations are above the subway subgrade and uniformly above water level as well.

"There are forty-five buildings of less than seven stories (assessed valuation \$7.000,000), twenty buildings of from seven to twelve stories in height (assessed valuation \$18,000,000), and ten buildings of from thirteen to twenty stories in height (assessed valuation \$15,000,000). Aside from three of the caisson type the foundations include wooden piles supporting concrete footings, steel and concrete grillages and continuous concrete

"Irrespective of the present construction the work in connection with the subway must be conducted with the view of not only permanently transferring the building loads to an adequate bearing outside of the influence of the contemplated excavation, but, in addition, of securing all underlying ground from any displacement which might affect the integrity of any portion of the abutting of adjacent buildings."

How have the engineers proceeded so far? Mr. Madden says:

"The method of underpinning contemplates the least possible disturbance of existing foundation piers or footings and is accomplished by introducing longitudinal steel beams or girders judiciously close to the bottom of the foundation, between which cross beams are placed on each side at each pier, and this steel grillage is then pinned into the footings and concreted solid, producing, in effect, a supplementary spread foundation. "Excavation is then started be-tween each set of piers for an underpinning pit below the grillage and the sides of the pit are protected with carefully placed horizontal sheeting boards as it increases in depth. This continues until ground level is attained, below which steel casings fourteen inches in diameter are sunk neck, with three and four rows Val. lace—Reg. 29. in two foot lengths with hydraulic jacks until they extend a proper distance below the bottom of the proposed subway excavation.

"When the required depth has been eached the casing is filled with conrete, and when the full number of considered and when the full number of considered and wide inserts—value .98". reached the casing is filled with concrete, and when the full number of piles are in place the pit is con-creted to within about two feet of the concreted grillage and, with vertical street struts, a direct transfer of Combinations-Nainsook-emb'y the load is effected by use of steel wedges and steel bearing plates, and this remaining space is then concreted and grouted solid with a rich cement grout. Grout is very cement which permeates and fills up all interstices.

"On the completion of the pit the foregoing operations are repeated until the requisite number for adequately supporting the building loads have been provided. In most instances these pits are made continuous by removal of the excavated soil It is this slow filtering which pre- the subway, Smith, Hauser & Macsuccessive operations so as to form a cut off wall for the entire length of the building, thus preventing any of drainage ditches and sumps, the trenches or drains are the engineers' of the adjacent buildings as it will displacement of soil under the integround water is drawn off by a slow field works in his battle with unstable cost to do the digging. In other rior floors or footings lying behind "In cases, however, where the ma-

terial encountered will permit the pits are connected with close sheeting: that is, tongued and grooved planks, to attain that purpose. These cut off walls are extended across each among the prisoners in the young man on the right path, greatly his face had been eradicated. Why, intersecting street. Up to date the Tombs and Sing Sing for many and it being the second offence, he angelic. and the progress has exceeded the years the Rev. James B. Curry, pastor of St. James's Roman Catholic mit that I was so disappointed and ditions in Auburn were such that they

best informed men in the city regard- case and decided to wipe my hands his incarceration there his character Square. "Not long after I had occasion to being transferred to Auburn, under he means the excavating done imme- saw such blouses at \$1.19. "Not long after I had occasion to being transferred to the changed conditions for the better, diately under the two layers of heavy visit Sing Sing, and while there I was the changed conditions for the better, diately under the two layers of heavy planking which take the place of the call James, had committed an assault voted much of his time to doing good asphalt paving of the street. "Grillage" is that building up of timbers placed crosswise which answers for the time being as a support, and this arrangement of grillage is one of the said to him, 'James, you look so good testless processes of the work. In some cases great wooden girders a full foot square in cross section and many feet long, rather inappropriately called "needle beams," are laid beneath the street crosswise, and then, as the dirt is dug away under them, supporting posts, equally sturdy but not more than six feet long, are placed upright to hold the needle beams aloft. It is in this fashion that the excavators get deeper down stage by

stage. The cutting from time to time has uncovered gas pipes, water mains, drains and sewers. These the subas tobacco, he had been able to save fore, before any of our suggestions can way builders disturb as little as possible When finished the William street subway will have a total length of "Here is a little incident which I renewed my interest in him. But I house and see the condemned prisoners 2,643 feet. The structure will be of standard two track type, requiring an to raise your voice in favor of abolish- excavation about 29 feet in width. tions. I sent the money to Father ing capital punishment. The prisoners which at stations will be increased in the death cells are under a terrible to the full width of 40 feet between the building lines to provide for island "My suggestion is that capital pun- platforms, from which stairways will

the prisoners in the death cells.

"On my next visit to Sing Sing prisonment be abolished and life imcextend to a mezzanine passageway prisonment be substituted, with the connecting with the entrance stairs to power of commutation removed from the surface. The depth to subgrade will vary that James was there, not as a pris- the Governor. However, such prisoners oner, but as a delegate at large from should be granted the privilege of a from 25 to 31 feet below the surface, Auburn, where they had some sort of new trial on the presentation of new and in general the exeavation will exbut when released it becomes quick- He wished to get married and I organization such as the Golden Rule evidence, &c. I think life imprison- tend from 3 to 5 feet below mean sand of acknowledged treacherous loaned him money, I think about \$19. Brotherhood which has been formed ment would be just as effective in high water, with a maximum of 14 at Sing Sing. When I met James I preventing crime as capital punish- feet at Maiden lane and 20 feet at Pearl street, below that datum.

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